ProAqua Produced Water Treatment System
Call for Commercialization Plans

Commercialization Opportunity

Los Alamos National Laboratory (LANL), the University of Texas at Austin (UT Austin) and the New Mexico Institute of Mining and Technology (NMT) have co-developed a system for the treatment of produced water resultant from oil and gas drilling activities. This technology, called the ProAqua system, was developed as an alternate disposal solution for produced water associated with the oil and gas (O&G) industry, which today generates hundreds of billions of gallons of brackish wastewater in the U.S. alone. Currently, O&G companies pay to have produced water trucked to reinjection sites for disposal—an expensive and time-consuming process that can represent as much as 10% of the total cost of hydrocarbon production. The ProAqua system for produced water offers O&G companies a cost-effective treatment process to decontaminate produced water, which can then be applied for beneficial use, whether industrial or agricultural.

LANL is currently seeking one or more partners to develop and commercialize the proprietary ProAqua system. LANL is requesting that all potential licensees submit a Letter of Interest to be received by LANL on or before COB **October 10, 2008**.

The Letter of Interest is the first stage in a due diligence / selection process that will enable LANL to choose the most qualified licensee(s) for the commercialization of this important technology. Further information regarding the technology and the commercialization process can be found within this document, as well as online at the following web site: www.lanl.gov/partnerships

LANL Mission

The Technology Transfer Division at Los Alamos National Laboratory is tasked with moving technologies from the laboratory to the marketplace for the benefit of society and the U.S. economy.

In addition to the Laboratory's commercialization objectives, LANL is interested in furthering research and development in environmentally-friendly technologies and water treatment in support of its programmatic objectives. Consequently, the Laboratory is also interested in entering into collaborative arrangements with interested parties in support of any resulting license agreement(s). LANL's strong capabilities in environmental research and development can be leveraged in order to accelerate the commercialization timeline for the selected licensee(s).

LANL Technology

Produced water associated with the O&G industry annually introduces hundreds of billions of gallons of brackish wastewater in the U.S. alone. Most produced water is highly saline and contaminated with a complex mixture of salts, volatile and semi-volatile organics, metals, organic acids, and particulates, as well as additives from the drilling process, including alcohols and surfactants. O&G companies pay to have this contaminated produced water trucked to reinjection sites for disposal—an expensive and time-consuming process that can represent as much as 10% of the total cost of hydrocarbon production.

LANL, in conjunction with its collaborators at NMT and UT Austin, has developed a new system for treating produced water. The three-part ProAqua treatment system includes a Surfactant-Modified Zeolite (SMZ), Vapor Phase Bioreactor (VPB), and Membrane Bioreactor (MBR). This treatment system offers O&G companies and water users a cost-effective treatment process to decontaminate produced water for beneficial use. In addition to lowering O&G production costs, this technology will provide a new water resource for industry and agriculture, and an environmentally friendly alternative for disposing of produced water.

The SMZ portion of the ProAqua system works by adsorbing organic compounds from produced water and filtering out iron and manganese floc that may be present. When saturated with organics, the SMZ is regenerated by air stripping. The off-gas is directed to the VPB, which biologically converts the volatile components, particularly BTEX, to innocuous by-products at up to 99% removal efficiency. The produced water is then pumped through the MBR component, which removes organic acids. This clean, saline water may be used in industrial applications as a weighted brine, or the ProAqua system can be coupled with a traditional reverse osmosis (RO) system to remove salts. The result is clean water that can be used for industrial or agricultural purposes, or safely reintroduced to a water system.

The ProAqua system may be fully automated to provide continuous produced water treatment, whether at a central treatment facility, or at individual well sites. This system may be used to treat produced water with a variety of contaminants, contaminant concentrations, flow rates, and stripping rates, making it flexible for use with produced water from nearly any location. Additional applications for the ProAqua system include treatment of bilge waters and co-produced waters from other industrial processes, such as power generation.

Intellectual Property

A patent is pending for this technology. This patent application will be available for either exclusive or non-exclusive licensing, depending upon LANL's commercialization strategy and the merits of the commercialization plan(s) selected. Additional details regarding the intellectual property will be provided to interested parties once a Non-Disclosure Agreement has been executed.

Letter of Interest

In response to LANL's previous marketing efforts, a number of organizations have expressed interest in the ProAqua system. LANL will select the most qualified licensee(s) through a competitive call for proposals—the Letter of Interest being the first step in that process.

In order to be considered a qualified respondent, your Letter of Interest should include the following information:

- Description of your company and its mission
- Explanation of the company's interest in the technology and its relevance to the company's goals and product offering(s)
- Demonstrated experience in developing and marketing a technology in this industry
- Brief description of the company's financial and human resources available for commercializing this technology

This letter must be received by COB **October 10, 2008**. Letters may be sent to the contacts listed below.

LANL Contacts

Marcus Lucero, Laura Barber and Erica Sullivan
Technology Transfer Division
Los Alamos National Laboratory
P.O. Box 1663, MS C334
Los Alamos, NM 87545
Telephone: 505-665-6569
Fax: 505-665-0154
Email: ProAqua@lanl.gov

Next Steps

Once LANL has received your Letter of Interest, we will ask that you execute a bilateral Non-Disclosure Agreement (NDA) with the Laboratory. This will need to be executed before LANL can share or receive any proprietary information.

Once the NDA has been executed, LANL will send a Commercialization Plan template to each qualified respondent that previously submitted a Letter of Interest. The package will include details regarding the following time line: 1) submission date for Commercialization Plans; 2) target date for selection of the most qualified licensee(s); and 3) the negotiation and license execution process. Commercialization plans will be held as company proprietary information and no information from one applicant will be shared with any other.

Commercialization Process

- Submit Letter of Interest by October 10, 2008 to the contact listed above.
- LANL will send a bilateral Non-Disclosure Agreement (NDA). Please sign and return to LANL within three (3) weeks of receipt.
- LANL may elect to hold a commercialization workshop to give all interested parties the opportunity to ask questions about both the technology and technology transfer process. If a commercialization workshop is not held, detailed information on the technology and technology transfer process will be shared with each respondent individually.
- Submit commercialization plan to LANL.
- Commercialization plans will be reviewed by the LANL selection committee.
- Selected licensee(s) will negotiate license terms with LANL.

Commercialization Workshop

Depending on the level of response to this Call for Commercialization Plans, LANL may elect to host a commercialization workshop / information session that would be open to any interested qualified respondent who has executed a Non-Disclosure Agreement with LANL. This information session would provide attendees with technical details, as well as a question and answer session. There would also be an opportunity for brief, individual breakout sessions as part of the commercialization workshop.

If LANL does not host a commercialization workshop prior to the due date for commercialization plans, then information on both the technology and the technology transfer process will be shared electronically with each respondent.

Licensee Selection Criteria

LANL's license negotiating team will select the most qualified licensee(s) based upon each company's Commercialization Plan and how adequately it meets the general selection criteria set forth below, including the technology commercialization strategy detailed therein. Our goal is to select the company(ies) that are most qualified and have the necessary experience and resources to successfully commercialize the technology. Specific evaluation criteria include, but are not limited to:

- Licensing interest. Exclusive or non-exclusive by specific application.
- Technology commercialization strategy (e.g., in-house manufacturing, partnering with industry leaders, sublicensing, etc.)
- Business and marketing plan
- Financial resources that will be dedicated to this commercialization project
- Instrumentation/technical expertise relevant to this technology
- Management team/Product champion

Thank you for your interest in pursuing this commercialization opportunity. If you have any questions or comments, please direct them to the ProAqua commercialization team (see contact information above). Additional information regarding this technology and the related intellectual property is available at: www.lanl.gov/partnerships. We look forward to receiving your Letter of Interest.